



## Climatic factors driving invasion of the tiger mosquito (*Aedes albopictus*) into new areas of Trentino, northern Italy

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### Abstract:

**BACKGROUND:** The tiger mosquito (*Aedes albopictus*), vector of several emerging diseases, is expanding into more northerly latitudes as well as into higher altitudes in northern Italy. Changes in the pattern of distribution of the tiger mosquito may affect the potential spread of infectious diseases transmitted by this species in Europe. Therefore, predicting suitable areas of future establishment and spread is essential for planning early prevention and control strategies. **METHODOLOGY/PRINCIPAL FINDINGS:** To identify the areas currently most suitable for the occurrence of the tiger mosquito in the Province of Trento, we combined field entomological observations with analyses of satellite temperature data (MODIS Land Surface Temperature: LST) and human population data. We determine threshold conditions for the survival of overwintering eggs and for adult survival using both January mean temperatures and annual mean temperatures. We show that the 0 degrees C LST threshold for January mean temperatures and the 11 degrees C threshold for annual mean temperatures provide the best predictors for identifying the areas that could potentially support populations of this mosquito. In fact, human population density and distance to human settlements appear to be less important variables affecting mosquito distribution in this area. Finally, we evaluated the future establishment and spread of this species in relation to predicted climate warming by considering the A2 scenario for 2050 statistically downscaled at regional level in which winter and annual temperatures increase by 1.5 and 1 degrees C, respectively. **CONCLUSIONS/SIGNIFICANCE:** MODIS satellite LST data are useful for accurately predicting potential areas of tiger mosquito distribution and for revealing the range limits of this species in mountainous areas, predictions which could be extended to an European scale. We show that the observed trend of increasing temperatures due to climate change could facilitate further invasion of *Ae. albopictus* into new areas.

**Source:** <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078124>

### Resource Description

#### Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

**Special Report on Emissions Scenarios (SRES) Scenario:** SRES A2

#### Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other

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elements of climate change to prevent harm to health

A focus of content

## **Exposure :**

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

**Temperature:** Fluctuations

## **Geographic Feature:**

resource focuses on specific type of geography

Mountain, Valley

## **Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** Italy

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Vectorborne Disease

**Vectorborne Disease:** Mosquito-borne Disease

**Mosquito-borne Disease:** Chikungunya, Dengue

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

## **Model/Methodology:**

type of model used or methodology development is a focus of resource

Exposure Change Prediction

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

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time period studied

Long-Term (>50 years)

### **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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